

Assignment

1 Objective

The objective of this assignment is to improve the performance of given baseline models on medical image segmentation datasets by proposing novel modifications beyond standard data augmentation techniques. You must analyze the baseline models and implement methodologically innovative enhancements to improve segmentation performance.

2 Datasets

You will work with the following datasets:

- **ISIC 2017** (Skin Lesion Segmentation)
- **Fetus Head Segmentation**
- **Lumbar Spine Segmentation**

The baseline models for each dataset are provided in the following document:
Baseline Models Spreadsheet

3 Task Requirements

1. Implement the model on the given dataset.
2. Implement **at least one novel improvement** beyond standard data augmentation.
3. Evaluate the proposed model using the specified segmentation metrics:
 - **IoU Score** (\uparrow)
 - **DICE Score** (\uparrow)
 - **F1 Score** (\uparrow)
4. Compare your proposed model with the baseline model using separate tables for each dataset.

4 Reporting Results

Your results should be presented in a structured table format for each dataset as shown below:

4.1 Example Table: ISIC 2017 Dataset

Model	IoU Score (\uparrow)	DICE Score (\uparrow)	F1 Score (\uparrow)
Baseline	0.78	0.81	0.80
Proposed	0.82	0.85	0.84

Table 1: Performance Comparison for ISIC 2017 Dataset

4.2 Example Table: Fetus Head Segmentation Dataset

Model	IoU Score (\uparrow)	DICE Score (\uparrow)	F1 Score (\uparrow)
Baseline	0.72	0.74	0.73
Proposed	0.78	0.80	0.79

Table 2: Performance Comparison for Fetus Head Segmentation Dataset

4.3 Example Table: Lumbar Spine Segmentation

Model	IoU Score (\uparrow)	DICE Score (\uparrow)	F1 Score (\uparrow)
Baseline	0.85	0.86	0.86
Proposed	0.88	0.89	0.89

Table 3: Performance Comparison for Lumbar Spine Segmentation

5 Submission Guidelines

- **Code Implementation:** Submit a well-documented Python implementation.
- **Report:** Include:
 - Baseline model details
 - Proposed improvement and justification
 - Performance comparison with tables
 - Analysis of improvements and limitations

6 Important Notes

- **Data augmentation alone will not be considered a novelty.** Your improvement must introduce methodologically significant changes such as **architecture modifications, attention mechanisms, etc.**
- Ensure proper validation and testing methodologies, and provide meaningful statistical comparisons.